NASA Procedural Requirements

NPR 8910.1C
Effective Date: December 02, 2011
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COMPLIANCE IS MANDATORY

Care and Use of Animals (updated w/Change 2 on 3/20/14)

Responsible Office: Office of the Chief Health & Medical Officer

Change History

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Change History

Chg #	Date	Description/Comments
1	8/05/13	Changes include update on Applicability, removing sentence in line one, add in items 1.6.13 to Responsbilities and update to Chapter 7, (7.1 & 7.2), adding in the word laboratory.
2	03/20/14	Updated Appendix F by removing the links and clarifying where the information can be located under References, NASA Policy & Requirements, PHS Policy and AVMA Guidelines on Euthanasia.

NASA management is committed to using live animals in Agency-supported research, testing, teaching, and hardware development activities only when necessary. When animals are required, the Agency shall comply with all applicable laws, regulations, and guidelines and ensure that the "NASA Principles for the Ethical Care and Use of Animals" (Appendix B) are incorporated in its programs, when applicable.

Preface

P.1 Purpose

This NPR delineates the responsibilities and implementing requirements for the Agency's use of animals in research, testing, teaching, and hardware development activities, including such activities conducted in non-U.S. facilities and space flight vehicles.

P.2 Applicability

a. This NPR applies to NASA Headquarters and NASA Centers, including Component Facilities, the Jet Propulsion Laboratory, a Federally Funded Research and Development Center, and to all activities involving animals funded by or sponsored by NASA or conducted in or on NASA facilities, aircraft, or spacecraft. Such activities include those conducted under a cooperative agreement or grant, contract, reimbursable agreement, or other arrangement or agreement entered into by NASA and another Government agency, private entity, non-Federal public entity, or foreign entity.

b.This NPR does not apply to livestock, or domesticated animals under non-NASA control that are permitted to be at NASA Centers or Facilities for other than research purposes (e.g., cattle leases and guide dogs), nor does it apply to animals used by NASA, contractors, or other agencies for law enforcement purposes.

P.3 Authority

NPD 8910.1, Care and Use of Animals.

P.4 Applicable Documents and Forms

a. Animal Welfare Act of 1966, as amended, 7 U.S.C. 2131 et seq.

b. Health Research Extension Act of 1985, as amended, Pub. L. 99-158, 99 Stat. 820 (1985).

c. Animal Welfare, 9 C.F.R., Ch. I, Subch. A, Pts. 1-4.

d. Care and Use of Animals in the Conduct of NASA Activities, 14 C.F.R., Pt. 1232.

e. U.S. Department of Health and Human Services, "Public Health Service Policy on Humane Care and Use of Laboratory Animals" (PHS Policy) (2002).

f. National Research Council, "Guide for the Care and Use of Laboratory Animals" (Guide) (1996).

g. United States Interagency Research Animal Committee, "U.S. Government Principles for the

Utilization and Care of Vertebrate Animals Used in Testing, Research, and Training" (1985).

h. Policy and Guidelines for the Use and Care of Animals in Space-borne Research, in Committee on Space Research (COSPAR) Information Bulletin: Space Research Today, Number 169, August 2007.

i. Council for International Organizations of Medical Sciences, "International Guiding Principles for Biomedical Research Involving Animals" (1985).

j. NPR 1440.6, NASA Records Management.

k. NPR 1441.1, NASA Records Retention Schedules.

l. NPD 8910.1B, Care and Use of Animals.

m. Institutional Animal Care and Use Committee Guidebook, 2nd Edition, 2002, DHHS, NIH, Office of Laboratory Animal Welfare; Applied Research Ethics National Association.

n. Occupational Health and Safety in the Care and Use of Research Animals, 1997, National Academy of Sciences Institute for Laboratory Animal Research.

P.5 Measurement/Verification

Adherence to this NPR will be measured through strict tracking of requirements outlined herein and detailed in NASA NPD 8910.1B, Care and Use of Animals. In general terms, for all NASA-sponsored research involving animals, the requirements shall include verification of accreditation and certifications, regular monitoring of research activities and sanctions imposed, and corrective actions taken.

P.6 Cancellation

NPR 8910.1B, Care and Use of Animals, dated October 7, 2009.

/S/
Dr. Richard S. Williams

Chapter 1. Responsibilities

1.1 The NASA Chief Health and Medical Officer (CHMO) is the Authorized NASA Official (ANO) for the care and use of animals. The CHMO may delegate duties of the ANO to a senior individual in the office of the CHMO. The ANO shall be responsible for:

a. Implementing the provisions of this NASA Procedural Requirement (NPR) and ensuring that all Agency programs and activities involving animals comply fully with all applicable laws, regulations, and guidelines.

b. Designating a NASA representative for the Interagency Research Animal Committee (IRAC).

c. Establishing and maintaining mechanisms for obtaining timely information from the Office of Laboratory Animal Welfare (OLAW) of all cases in which the assurance of an institution involved in NASA research has been withdrawn by the Public Health Service (PHS); and notifying NASA Institutional Animal Care and Use Committees (IACUC), Center Directors, Institutional Officials (IOs), and Research and Flight Program Managers of such revocations so that they can determine if NASA awards involving the use of animals are affected and take appropriate actions.

d. Reviewing all sanctions imposed by Center Directors or IACUCs to determine if further sanctions are warranted, or, at his or her discretion, initiating investigations of alleged noncompliance with this NPR and imposing sanctions when warranted.

e. Appointing the NASA Chief Veterinarian, who shall report to the ANO.

f. Establishing and maintaining mechanisms to notify the NASA Chief Veterinarian, NASA IACUCs, Center Directors, IOs, and Research and Flight Program Managers of reports of noncompliance with the Animal Welfare Act (AWA), PHS, and this NPR that are received from non-NASA institutions where animal research is supported by NASA.

g. Designating a NASA representative(s) for the Committee on Space Research (COSPAR) Panel on the Care and Use of Animals in Space-borne Research.

1.2 The NASA Animal Policy Review Board (APRB) shall be responsible for meeting in person at least once per year and convening via a teleconference at least once each calendar year to accomplish the following:

a. Reviewing and reaffirming that animal research, testing, and training are activities necessary for the achievement of NASA goals and objectives.

b. Reviewing and reaffirming the "NASA Principles for the Ethical Care and Use of Animals;" 1.2.3 reviewing animal care and use policies and procedures, issues, and this NPR.

c. Cooperatively developing common procedures, guidance, training, documentation, and forms which provide uniform and progressive application of professionally accepted standards at all NASA Centers involved in animal care and use activities.

d. Reviewing each Center's Animal Care and Use Program at least once annually, through a review of the Center's semiannual IACUC reports and other information as needed.

e. Coordinating the Center's Animal Care and Use Handbooks, IACUC Reference Manuals, Animal Care and Use Protocol Form, and Animal Care and Use Standard Operating Procedures Workbooks to maximize commonality.

f. Exchanging information regarding issues and practices pertaining to animal care and use.

g. Recommending changes in NASA policies and procedures to the ANO and Center Directors, as appropriate.

h. Serving as a source of expertise and advocacy on animal care and use issues for the ANO, IACUC's, and NASA management.

i. Assisting the ANO in developing responses to public, organizational, and legislative inquiries and comments about NASA animal activities.

1.3 The NASA Flight Animal Care and Use Panel (NFACUP) shall be responsible for the following:

a. Reviewing and providing policy concurrence on all protocols using animals that are associated with space flight activities supported by NASA. No NASA-supported space flight activity using animals will be conducted without such review and concurrence by the NFACUP. The NFACUP may disapprove animal activities, but may not approve an activity related to the care and use of animals if the activities have not been approved by the appropriate Center IACUC.

b. Providing Agency animal care and use policy approval for space flight activities.

c. Providing assurance to the ANO that all animal research conducted in space flight meets the requirements of all applicable Federal regulations, and that a comprehensive review of benefits and risks has been completed.

d. Assuring NASA compliance with the COSPAR "Policy and Guidelines for the Use and Care of Animals in Space-borne Research."

1.4 Center Directors shall be responsible for the following:

a. Signing the Center's Animal Welfare Assurance, making a commitment on behalf of the Center that the requirements of this NPR will be met. Center Directors may delegate authority for the day-to-day management of their Center's Animal Care and Use Program, but they retain the ultimate responsibility for ensuring compliance with the AWA, PHS Policy, the Guide, and this NPR at their Centers. In addition, only Center Directors may appoint personnel to the IACUC.

b. Serving as the Center's IO or delegating, in writing, an IO who meets the requirements of the PHS Policy and AWA to perform the following:

(1) Establishing and supervising the functioning of their Centers' IACUC. This responsibility may be accomplished through the use of another Center's IACUC via a formal inter-Center agreement.

(2) Signing and submitting to OLAW the AWA, committing the Center to the requirements of the PHS Policy and this NPR in all Center activities involving animals. Providing copies of the approved AWA, OLAW letter of approval, and any OLAW correspondence to the ANO.

(3) Approving and signing the application for Association for Assessment and Accreditation of Laboratory Animal Care (AAALAC) International Accreditation and the annual AAALAC International reports. Providing copies of the AAALAC International Accreditation letter, the annual reports, and any correspondence from AAALAC International to the ANO.

(4) When applicable, approving the annual report to the U.S. Department of Agriculture (USDA) and providing copies of the report and any comments from USDA to the ANO.

(5) Deciding and administering sanctions in cases of noncompliance with this NPR, in accordance with the AWA, its implementing regulations, PHS Policy, and NASA personnel policies; and notifying appropriate funding officials and the ANO.

(6) Providing the ANO with copies of all IACUC minutes and reports.

1.5 The NASA Chief Veterinarian shall be responsible for the following:

a. Coordinating veterinary and animal care activities across NASA institutions. In accomplishing this responsibility, the NASA Chief Veterinarian is specifically authorized to halt any animal activity he or she believes to be noncompliant with applicable laws, regulations, this NPR, and approved protocols. Following halting of any activity, the NASA Chief Veterinarian will initiate action, including IACUC re-review, to resolve the situation.

b. Guiding, as Chairperson, the activities of the APRB.

c. Advising the ANO on any aspect of the Agency's Animal Care and Use Program.

d. Representing NASA in the external Laboratory Animal Science community and associations.

e. Participating in the development, review, and approval of requirements for all animal facilities and equipment for flight as related to animal care and use.

f. Maintaining coordination with the International Council for Laboratory Animal Science (ICLAS) and COSPAR.

g. Informing international entities and individuals about the technical requirements in accordance with U.S. laws, regulations, guidelines, standards, and this NPR. This will include information regarding the requirements and constraints for flight animal research activities.

h. Serving as the Chair of the NFACUP.

i. Reviewing all material associated with a proposal that would otherwise be funded, but originally coded as "unacceptable" during the Vertebrate Animal Science Review (Chapter 7), and making a determination if it can be deemed "acceptable."

1.6 IACUC shall be responsible for the following:

a. Performing responsibilities in accordance with provisions given in the Animal Welfare Act, its implementing regulations, PHS Policy, and the Guide.

b. The IACUC at the Ames Research Center (ARC) is charged with reviewing all space flight activities and any supporting ground-based activities.

c. When animals are housed at a NASA Center (host Center), the host Center's IACUC is responsible for their care and use and for reviewing, approving, or disapproving those parts of proposals that call for the use of the Center's facilities housing the animals.

d. Although in-flight spacecraft may contain facilities that are by definition "Animal Facilities," it is recognized that IACUC inspection of such facilities are impractical and often impossible. However, to meet the intent of the AWA in regards to monitoring animal facilities, the ARC IACUC and IACUC of the Center that developed and/or managed the in-flight hardware or facilities will review all in-flight and post-flight crewmembers' reports regarding animal hardware performance. Any reported deficiency or failure must be evaluated by the ARC IACUC and host Center's IACUC in regards to the welfare of animals being maintained in flight. Any deficiency or failure determined to potentially impact animal well-being negatively will be reported immediately to the appropriate Center Director, the NASA Chief Veterinarian, and the ANO. OLAW will also be notified of such deficiencies or failures if the in-flight animal activities involve PHS funding.

1.6.2 Approving, disapproving, or requiring modifications to be made in those components of

proposed activities involving the care and use of animals that are submitted by investigators. In addition, IACUC's have the authority to suspend previously approved activities involving animals. All decisions shall be based on the response of a majority of a quorum of the members present and shall be accurately recorded in the minutes of the meeting. In conducting the reviews of proposed activities involving animal care and use, IACUC members will ensure that the "NASA Principles for the Ethical Care and Use of Animals" are met.

1.6.2.1 Animal activities that have been approved by the IACUC may be subject to further review by the Center Director, ANO, or other NASA officials, as appropriate. These officials may disapprove animal activities but may not approve an activity related to the care and use of animals if the activities have not been approved by the IACUC.

1.6.3 Including in its membership, in accordance with the AWA and its implementing regulations, and PHS Policy, at least one Doctor of Veterinary Medicine with training or experience in Laboratory Animal Medicine and who has direct or delegated program authority for activities involving animals, a practicing scientist experienced in research involving animals, an individual not affiliated with the institution in any way other than as a member of the IACUC, and at least one member whose primary concern is in a nonscientific area such as an ethicist, lawyer, or member of the clergy.

1.6.4 Approving personnel qualifications and training.

1.6.5 Reviewing the Center's program for humane care and use of animals, at least once every six months, and inspecting all of the Center's animal facilities (including satellite facilities), using the AWA and its implementing regulations, PHS Policy, and the Guide as a basis for evaluation. The report, signed by a majority of the IACUC members, must be submitted to the ANO through the IO.

1.6.5.1 Reports of the reviews and inspections must contain a description of the nature and extent of the Center's adherence to the AWA, its implementing regulations, PHS Policy, the guide, and this NPR. They must specifically identify any departures from the provisions of the guide and this NPR and must state the reasons for each departure. In addition, they must contain specific reference to the Committee's efforts to incorporate bioethical considerations in its reviews of proposed animal care and use activities.

1.6.5.2 The reports must distinguish significant deficiencies from minor deficiencies. A significant deficiency is one that, consistent with PHS Policy definitions, and, in the judgment of the IACUC and the Center Director, is or may be a threat to the health or safety of the animals. The IACUC, through the IO, will report promptly any such deficiencies to OLAW.

1.6.5.3 If program or facility deficiencies are noted, the reports must contain a reasonable and specific plan and schedule for correcting each deficiency.

1.6.6 Reviewing and approving, requiring modifications in (to secure approval), or withholding approval of those components of proposed activities or significant changes to ongoing activities related to the care and use of animals. Once approved, no significant changes can be made until a written request with appropriate justification is submitted to and approved by the IACUC.

1.6.7 Conducting continuing reviews of approved animal activities at appropriate intervals as determined by the IACUC, but at least once every 12 months.

1.6.8 Establishing mechanisms for ensuring the reporting, receipt, and review of concerns involving the care and use of animals.

1.6.9 Making recommendations to the IO regarding any aspect of the Center's animal program, facilities, or personnel training.

1.6.10 Providing copies of meeting minutes and reports of semiannual inspections and reviews to the IO who will forward copies, with any recommendations pertaining to Agency-wide issues, to the ANO and the NASA Chief Veterinarian.

1.6.11 Reporting, in writing, the following to the ANO, as well as USDA, the Animal and Plant Health Inspection Service (APHIS), and OLAW as required, through the IO, at least once every 12 months:

a. Changes in the description of the Center's program for animal care and use.

b. Changes in the Center's program or facilities that would affect the AAALAC International accreditation status.

c. Changes in the IACUC membership.

d. A statement that the Center has no changes to report, if there are no changes.

e. Any recommendations, including minority views, for changes in NASA-wide facilities, policies, or procedures.

1.6.12 Promptly provide, through the IO, the ANO, as well as USDA, APHIS, and OLAW, as appropriate, with a full explanation of the circumstances and actions taken, with minority views, if any, with respect to the following:

a. Any deviation resulting in serious or continuing noncompliance with the provisions of the Guide, AWA, its implementing regulations, PHS Policy, or this NPR.

b. The reasons for any suspension or termination of approval documented in writing with copies provided promptly to the Principal Investigator (PI), the Center Director, OLAW, and the ANO. If an IACUC suspends a research activity that has already been approved, the PI will be given written documentation regarding the reason for such action and will be afforded the opportunity to take corrective actions to resolve the situation.

c. Any adverse actions by, or communication from OLAW, AAALAC International, or USDA.

1.6.13 Conducting an initial intake evaluation of all research field study and environmental management protocols (or a summary) to determine if the full protocol requires IACUC review, based on the guidelines provided in the PHS Policy and its supporting material.

Animal population control activities for health and safety reasons (example - removal of bird populations near an airfield that pose a hazard to aircraft operations) do not require IACUC review, but shall be carried out with veterinary consultation and guidance.

1.7 The Institutional Review Board (IRB), Committee for the Protection of Human Subjects, Johnson Space Center (JSC), if the experiment involves the exposure of the crewmembers to research animals, shall review and approve the proposal and modifications to ensure the protection of the crew from exposure to zoonotic risk and other health-related concerns. The IRB may also review proposals and modifications to ensure that the orbiter and flight hardware will not be chronically contaminated by zoonotic agents potentially carried by research animals. Copies of documents indicating IRB action in regards to projects involving animals will be provided to the ANO and the responsible IACUC(s).

1.8 Care and Use of Animals personnel shall be responsible for the following:

a. Maintaining animals in accordance with contemporary standards, laws, and regulations.

b. Obtaining and maintaining, through training and experience, proficiency in regards to the procedures they perform involving animals.

c. Reporting any deficiencies in procedures for animal care and use activities or issue of noncompliance with applicable laws, this NPR, and IACUC approvals to the veterinarian, IACUC chairperson, NASA line management, or NASA Inspector General.

1.9 PIs, including those resident at NASA Centers, shall be responsible for the following:

a. Complying with, and ensuring their research staff comply with, those responsibilities applicable to all animal care personnel described above in section 1.8.

b. Obtaining IACUC approval from each institution where research will be conducted for all successfully peer-reviewed proposals requesting the use of animals. NASA will not provide support for proposals that have passed peer review until proof of IACUC approval is submitted. In the case of international investigators, proof of approval for the use of animals must be provided by a governmental or agency level equivalent of an IACUC.

c. Including the PHS AWA number from OLAW for the institution at which the research is to be conducted. Proposals from U.S. and foreign institutions without an approved assurance on file with the National Institutes of Health (NIH) OLAW must provide one of the following:

(1) proof of current accreditation from AAALAC International,

(2) documentation of institutional animal care and use ensuring compliance with the PHS Policy, or

(3) documentation of institutional animal care and use ensuring compliance with the Council for International Organization of Medical Sciences (CIOMS), "International Guiding Principles for Biomedical Research Involving Animals."

1.9.1 Conducting all animal activities in accordance with approved Animal Care and Use Protocols.

1.9.1.1 NASA employees who wish to conduct research using animals at a non-NASA facility must provide documentation to the IACUC at their Center stating that the research has been approved by the IACUC at the institution where the work will be conducted.

1.9.2 Providing results to the IACUC, particularly those results, outcomes, and assessments of animal condition and health that will allow the IACUC to continually monitor the adequacy of animal well-being and unintended consequences which adversely affect animal well-being.

1.9.3 Using experimental designs and procedures that accomplish the following:

a. Minimize the numbers of animals necessary to obtain scientifically valid results.

b. Incorporate refined techniques that eliminate or minimize animal pain and distress.

c. Replace animals with no animal systems whenever possible.

d. Notify Program/Project Managers and the responsible IACUC, in writing, of deviations, unexpected outcomes, or proposed significant changes in approved protocols.

1.10 PIs and NASA personnel working in non-U.S. laboratories under NASA sponsorship are responsible for the following:

a. Conducting all animal activities in accordance with the animal care and use standards as defined in this NPR, the PHS Policy, the AWA, its implementing regulations, or as defined by the host country, whichever is more demanding.

b. Not participating in animal activities if the standards defined in this NPR, the PHS Policy, the AWA and its implementing regulations, or the standards of the host country cannot be met.

c. Reporting as soon as possible, with follow-up hard copy, their decision that they cannot participate in animal activities to the NASA Program Manager, appropriate Center Director, the appropriate IACUC, the NASA Chief Veterinarian, and the ANO.

1.11 Program and Project Managers shall be responsible for the following:

a. Determining that Investigators and PIs comply with subsections 1.9 and 1.10 of this NPR and withholding funding from those that do not.

b. Ensuring that NASA has received documentation that proposals requesting NASA support for activities comply with subsection 1.9 of this NPR and certifying compliance to the selection official prior to providing NASA support.

c. Ensuring that space flight activities comply with Chapter 4 of this NPR and certifying compliance to the selection official prior to selection for NASA support.

d. Ensuring that the Vertebrate Animal Science Review (VASR) (Chapter 7) is conducted according to the requirements and stipulations of this NPR, encompassing:

(1) Including the text contained in Appendix E in all appropriate research solicitations. (The material in Appendix F is additional material that may be helpful to applicants. Its inclusion in research solicitations is at the discretion of NASA staff, although the "Detailed Instructions for Preparation of the VASR Worksheet" is strongly recommended).

(2) Performing an administrative review of each VASR worksheet, checking that all five points are addressed.

(3) Providing scientific merit reviewers with instructions for conducting the VASR, noting that all five points must be evaluated as appropriate for the proposal to be coded as "acceptable." (Appendix G provides additional information that can be used for instructing reviewers).

(4) Ensuring the scientific merit review panels evaluate the information provided in the VASR worksheet to determine if it is complete and if plans for the use of vertebrate animals are appropriate relative to the scientific work proposed, and code the proposal.

(5) Ensuring that if there is a proposal(s) to be reviewed using non-human primates, that the scientific merit review panel includes at least one member with expertise and knowledge of the species to be used.

(6) Including reviewers' comments, and any concerns, in the proposal review summary statement, subsequent to the scientific review panel VASR.

(7) Obtaining additional information or clarification from the applicant to resolve concerns for any proposal found to be "unacceptable," if it is to be recommended for funding.

(8) Providing the NASA Chief Veterinarian with all relevant information to allow a determination of the final disposition of the VASR coding of the proposal.

(9) Verifying that the institutional Animal Welfare Assurance number is provided and obtaining verification of IACUC approval before funding is awarded.

1.12 Attending veterinarians at NASA Centers shall be responsible for the following:

a. Managing and providing the clinical veterinary care program to include all requirements specified

as "Adequate Veterinary Care" in the AWA's implementing regulations and PHS Policy.

b. Serving as a voting member of the Center's IACUC.

c. Ensuring that all animal care and use activities are monitored and that the attending veterinarian is aware of the results of such monitoring.

d. Maintaining surveillance of the health and condition of animals in the animal colony and those being used in research activities.

e. Reporting any unresolved deficiencies in animal care, use, and treatment, or any activity that is not being conducted in accordance with the description of that activity provided by the PI and approved by the IACUC, to the Center Director, IACUC, and the NASA Chief Veterinarian.

f. Immediately halting activities deviating from IACUC-approved practices or procedures or from professionally accepted animal care and use practices. In cases where the differences between the investigator or animal care provider and the veterinarian cannot be resolved within 24 hours, the matter must be immediately brought to the attention of the IO and IACUC Chair for review and resolution.

g. Participating in the training of personnel in the handling of animals and in specimen-sampling procedures and other professionally accepted standards of animal care and use.

h. Overseeing all schedules and procedures for training and acclimating animals.

i. Reviewing pre-surgical, surgical, and post-surgical procedures to verify that the principles of the Guide for survival surgery are used. When necessary, the veterinarian will provide or arrange for training necessary to qualify investigators and other animal users.

j. Reviewing and verifying the appropriateness of all veterinary medical and experimental procedures performed on animals.

k. Reviewing and approving, in consultation with the NASA Chief Veterinarian, the design requirements and changes of local animal facilities for support of ground and space flight animal activities.

1.13 Selection officials, as the individuals selecting or approving grants, contracts, agreements, awards, and reimbursable arrangements shall be responsible for the following:

a. Ensuring that investigators have IACUC approval from their home institution and that, if applicable, their home institution has an approved OLAW assurance or meets the criteria of section 1.9.3 prior to funding of any animal-related activities, and

b. Including a copy of this NPR with each request for proposal and notification of selection.

1.14 Crewmembers serving as the animal care personnel during a flight activity shall be responsible for the following:

a. Participating in assigned pre-flight training to gain proficiency in accomplishing activities and procedures involving animals.

b. Providing scheduled status reports to the duty veterinarian or NASA Chief Veterinarian on animal health and well-being during in-flight operations.

c. Reporting promptly to the duty veterinarian or NASA Chief Veterinarian any problems affecting animal welfare during space flight, such as deficiencies in hardware or in procedures for animal care and use.

d. Providing the NASA Chief Veterinarian with in-flight and post-flight reports regarding hardware performance and animal care and use procedures.

e. Ensuring that animal welfare requirements receive priority during the conduct of flight activities.

1.15 The duty veterinarian or NASA Chief Veterinarian shall have the responsibility and authority to serve as the attending veterinarian during space flight activities.

1.15.1 The Chief Veterinarian or designated duty veterinarian has sole authority in all matters related to the euthanasia of animals during a mission.

Chapter 2. Recordkeeping Requirements

2.1 Each NASA Center involved in activities using animals shall manage the following records in accordance with NPR 1441.1, NASA Records Retention Schedules to ensure their proper maintenance, safeguarding, and disposition of the following:

a. An approved AWA.

b. Minutes of IACUC meetings, including records of attendance, activities of the committee, and committee deliberations.

c. Records of proposals, protocols, and proposed changes in the care and use of animals and whether IACUC approval was given or withheld.

d. Records of semiannual IACUC reports and recommendations (including minority views) as forwarded to the IO.

e. Copies of USDA Annual Reports and any USDA correspondence pertaining thereto.

f. Records of AAALAC International accreditation, including application, acceptance notification, annual reports, and any AAALAC International correspondence.

g. The NASA NPD and NPR on Animal Care and Use and the Animal Care Facility Work Instruction.

h. All records for at least three years after completion of animal activities.

i. All records pertaining to the acquisition and dispersion of controlled substances in accordance with Drug Enforcement Agency (DEA) requirements.

2.2 Animal records shall be maintained on all animals used in NASA facilities, aircraft, and spacecraft. While it may be appropriate to maintain only group records for some animals (such as rodents) used in ground-based studies, to the extent possible, individual records will be established and maintained for all animal mammalian species and, when practical, for all vertebrate animals that are candidates for in-flight space flight experiments and can be individually identified, regardless of species. NASA-sponsored investigators at non-NASA institutions are expected to maintain similar animal records for animals used for space flight baseline studies.

2.2.1 Information to be included in these animal records includes, but is not limited to, a description of the animals (such as species, breed/strain, sex, and age); receipt and quarantine data, including transportation information such as waybill numbers and means of transportation; administration of prophylactic vaccinations or treatments; history, diagnosis, clinical test results, treatments, and outcomes of any illnesses; any observations regarding the animals' behavior or physical abnormalities; documentation of all experimental manipulations, including detailed surgical and post-surgical reports; and disposition information, including the results of any necropsy performed (animals dying of unknown causes should be necropsied by a qualified veterinarian, as appropriate). Other information that is appropriate for inclusion in these animal records are technicians' observations regarding the animals' overall condition and appetite, the animals' standing within a group's dominance hierarchy, and documentation of the animals' involvement in cases of human injury (from biting and scratching).

Chapter 3. Approval for Use of NASA Facilities and Equipment

3.1 Each NASA Center IACUC shall review and approve, require modifications in (to secure approval), or withhold approval of those parts of proposals that call for the use of their facilities or equipment to conduct any activity involving animals.

3.2 The ARC IACUC shall review and approve, require modifications in (to secure approval), or withhold approval of those parts of proposals that call for the use of NASA space flight facilities or equipment to conduct any activity involving animals.

Chapter 4. Space Flight Activities

4.1 In addition to review by the investigators' IACUCs, space flight and supporting ground-based activities involving animals shall be approved by the ARC IACUC, which is charged with reviewing all space flight research protocols in accordance with the AWA, its implementing guidelines, PHS Policy, and this NPR.

4.1.1 Associated ground-based activities of flight proposals shall also be reviewed by the IACUC at the Center where the work will be conducted.

4.1.1.1 The ARC IACUC shall also review any ground-based activities not reviewed by another Center IACUC.

4.1.1.2 When ground-based activities are performed by an international partner, the laws and regulations of the country where the activities occur must be followed, with a minimum standard being the international guiding principles, "International Guiding Principles for Biomedical Research Involving Animals" and the COSPAR Policy and Guidelines for the Use and Care of Animals in Space-borne Research.

4.1.2 Once reviewed by the ARC and appropriate Center IACUCs, the results of those reviews shall be submitted to the NASA Flight Animal Care and Use Panel (NFACUP). The NFACUP provides Agency animal care and use policy concurrence for space flight activities and also assures NASA compliance with the COSPAR Policy and Guidelines for the Use and Care of Animals in Space-borne Research.

4.1.2.1 The NFACUP shall review the proposal and provide concurrence. Any issues identified will be reconciled with the relevant parties before concurrence is provided.

4.1.2.2 The NFACUP will be chaired by the NASA Chief Veterinarian, and membership will minimally consist of the Chairs of all NASA Center IACUCs or their delegated representative. Additional members may be added as needed at the discretion of the Chair. It will be convened on an "as needed" basis.

4.1.2.3 A Center IACUC NFACUP member may participate in discussions regarding activities reviewed by their IACUC but not participate in concurrence decisions regarding such activities.

4.1.2.4 The NFACUP will submit each evaluation report to the ANO.

4.2 The process outlined in section 4.1 shall be applied to all experiments flown on NASA space flight platforms, regardless of the sources of support, and to all experiments flown on non-NASA platforms, including international vehicles, if they are supported by NASA.

4.3 Animal activities to be flown on board NASA-crewed spacecraft shall be reviewed by the IRB at JSC (i.e., Committee for the Protection of Human Subjects) for areas related to crew health and safety associated with exposure to the animals.

4.4 Where multiple experiments approved individually are proposed to be conducted with the same experimental animal, an integrated proposal shall be reviewed by the responsible Center IACUC and the NFACUP prior to commencement of integration studies.

4.5 Protocols submitted to the responsible Center IACUC for proposed flight activities shall include an animal use and disposition plan that incorporates all animals necessary to support any proposed flight activity, including those necessary to cover launch delays and other contingency planning.

Such plans will also include animals required to support any ground-based studies necessary to validate or integrate proposed in-flight, animal-based activities and hardware. It is the responsibility of the payload developer to obtain agreement with payload integration organizations and animal care and use oversight bodies regarding the development and review of crew training products and in-flight procedures.

4.6 As part of the review of proposed animal care and use activities, Agency IACUC's shall ensure that investigators and NASA program, project, and mission managers minimize the number of animals involved.

4.7 Animal activities utilizing a NASA ground facility in support of space flight activities shall also be approved by that Center's IACUC and concurrence received from the NFACUP, regardless of the institutional or national origin of the activities or the sources of support.

4.8 For veterinary care, compliance, and response to events during flight, the following guidelines shall apply:

a. The ARC and original reviewing Center IACUCs, with the concurrence of the NFACUP, are responsible for approved animal care and use procedures and activities including pre-flight, flight, and post-flight.

b. The NASA Chief Veterinarian is responsible for veterinary support and for identifying a duty veterinarian available in person or by telephone at all times during flights that include animal activities.

4.8.1 The NASA Chief Veterinarian or designated duty veterinarian shall be the sole point of contact for the Flight Director and all mission managers for all animal care and welfare issues during flight.

4.8.2 Protocols for animal activities may need to be modified in flight as procedures are refined in response to operational constraints or experimental variation. When this occurs, the following procedures shall be followed:

4.8.2.1 Significant changes to protocols that become necessary during flight require the approval of the majority of a quorum of the ARC IACUC or other designated IACUC. The IACUC Chairperson or designee will expeditiously seek this approval by designated review consistent with current acceptable procedures.

4.8.2.2 The duty veterinarian has the authority to temporarily suspend activities or to grant a temporary approval to the requested change until the IACUC can review the request.

4.8.2.3 Communications through standard mission management channels shall be used to immediately notify appropriate personnel of this requested substantive change or temporary suspension of activities.

4.8.2.4 The NASA Chief Veterinarian or designated duty veterinarian has sole authority in all matters related to the euthanasia of animals during a mission.

4.9 Mechanisms for interaction and coordination among NASA IACUCs and veterinarians with responsibilities for preparation, execution, and post-flight animal activities shall be developed and implemented by the NASA APRB, with concurrence and approval of the ANO.

4.10 Science requirements for flight experiments shall specify the resources required and mission priorities necessary to ensure that animal welfare requirements are met during the conduct of space flight research and should provide decision paths to be followed in the event that resource requirements cannot be met.

Chapter 5. Disposition of Research Animals

5.1 In order to consistently utilize animals in a humane and meaningful manner, animals which are no longer needed for research, including animals not used due to launch delays and other flight contingencies planning, shall be utilized according to the following guidelines:

a. Animals that have had no surgical, chemical, or radioactive intervention will be returned to stock and assigned for use by any NASA-sponsored investigator who possesses an approved Animal Care and Use Protocol. Animals that have had surgical intervention may be assigned to other approved protocols; however, animals that have had major surgery may not be assigned to protocols that would require an additional major survival surgery.

b. The responsible IACUC may approve transfer of animals for use by other Federal institutions, NASA-funded, non-Federal institutions, or other non-Federal institutions that have OLAW or AAALAC International approved assurances, in that order of priority.

c. If no approved investigator or institution can be found, animals that have had no surgical, chemical, or radioactive intervention may be euthanatized, and the carcasses may be provided to suitable organizations involved in the care and maintenance of endangered species or the care and rehabilitation of sick or injured animals, or they may be disposed of in accordance with procedures approved by the applicable IACUC.

d. Animals that have been exposed to a hazardous compound, experimental drug, radionuclides, or that have been subject to a major operative procedure as part of the experimental protocol may be returned to stock and assigned for use in other approved activities if determined by the applicable IACUC that such use is appropriate. Otherwise, they may be euthanized and disposed of in accordance with NASA guidelines governing the disposal of radioactive, biological, and chemical waste.

Chapter 6. Sanctions

6.1 PIs not employed by NASA, whose activities are supported by NASA but whose activities using animals are restricted to non-NASA facilities, shall be subject to the control of their institution's IACUC, the responsible Center Director, and the Program Manager when appropriate. Notification of noncompliance with the AWA's implementing guidelines, PHS Policy, and this NPR shall be made by the non-NASA institution to the Director of the NASA Center through which the activity has been supported and to the ANO. Any continued noncompliance may be cause for termination of funding or support.

6.2 At NASA Centers, the process for imposing sanctions shall be as follows:

a. Deficiencies in animal care and use at any NASA facility by anyone (such as investigators, animal care personnel, visiting scientists, support contractors) may result in the halting of such activities as directed by the NASA Chief Veterinarian, NASA Center attending veterinarian, or line management. If someone other than the Center's attending veterinarian has halted an activity, it must be immediately reported to the attending veterinarian. It must also be brought to the attention of the IACUC Chair within two business days. If the issue cannot be immediately resolved to the satisfaction of the attending veterinarian, the IACUC will review the activity.

b. The IACUC may suspend an activity that it previously approved if it determines that the activity is not being conducted in accordance with applicable provisions of the AWA, its implementing regulations, PHS Policy, this NPR, or as described in the approved protocol. The IACUC may suspend an activity only after review of the matter at a convened meeting of a quorum of the IACUC and with the suspension vote of a majority of the quorum present. Any suspension of an approved activity will include a statement of the reasons for the action and will be promptly reported to the PI and the appropriate IO.

c. If the IACUC suspends an activity involving animals, the IO, in consultation with the IACUC, shall review the reasons for suspension, take appropriate corrective action, and report that action with a full explanation to OLAW and the ANO. The IO will also formally report such actions to the PI, appropriate Center Director, and Program or Project Manager responsible for supporting the activity. In the case of investigators from non-NASA institutions, notification shall also be sent to the management and IACUC at the investigator's institution.

d. If the PI fails to take appropriate corrective action, the IACUC can terminate a study.

e. In cases where an investigation is terminated, the Center Director, in consultation with the Center Chief Counsel, may also impose additional appropriate sanctions, and report his or her actions with a full explanation to the ANO.

f. The ANO, after reviewing the actions of the Center Director, may, in consultation with the NASA General Counsel, impose further sanctions, as appropriate.

Chapter 7. Vertebrate Animal Science Review

7.1 Any laboratory research proposal submitted to NASA that requests funding for vertebrate animal research shall undergo a Vertebrate Animal Scientific Review (VASR) conducted by the science merit review panel.

7.2 All NASA research solicitations requesting laboratory studies that use vertebrate animals or that could result in laboratory studies using vertebrate animals being submitted shall contain at a minimum the text provided in Appendix E regarding the VASR.

7.3 A proposal using vertebrate animals shall be coded as "no concerns/acceptable" by the VASR before any funds are awarded.

7.4 Any issues related to a proposal coded as "concerns/unacceptable" by the VASR shall be resolved by the NASA Chief Veterinarian, through the Office of the Chief Health and Medical Officer, and the proposal re-coded as "no concerns/acceptable" before any funds are awarded.

Appendix A. Definitions

The following definitions of terms are compatible with terminology in the Animal Welfare Act (AWA) and Public Health Service (PHS) Policy and apply to the conduct of all NASA activities related to the care and use of animals.

Activity includes research, testing, teaching, development of hardware for animal use, flight experimentation, and any other tasks involving the care and use of animals. This includes activities such as those requiring primary tissue cultures derived from live animals.

Association for Assessment and Accreditation of Laboratory Animal Care (AAALAC) International is a nongovernmental, nonprofit organization established for the purpose of conducting elective, voluntary professional review and accreditation of laboratory animal care and use programs. Initial accreditation is achieved following a satisfactory onsite review by professionals knowledgeable of the field of Laboratory Animal Science and is maintained by submission of satisfactory annual reports and onsite re-reviews every three years.

Animal means any live or dead vertebrate animal that is being used or intended for use in research, teaching, testing, or experimentation or hardware development. Wildlife and agricultural animals are included only when they are used in nonagricultural research activities.

Animal care personnel are individuals directly involved in the care and monitoring of animal well-being, including animal or veterinary technicians or technologists, animal trainers, veterinarians, facility managers, and crewmembers.

The Animal Facility and Study Area is any and all buildings, rooms, areas, enclosures, or vehicles, including satellite facilities, used for animal housing or holding, transport, maintenance, breeding, or experiments inclusive of surgical manipulation. A satellite facility is any containment (including spacecraft, sounding rockets, aircraft, balloons, and related equipment during experimental activities) or ground-based facilities outside of a core facility or centrally designated or managed area in which animals are housed for more than 12 hours. Vehicles used to transport animals between facilities must meet environmental control standards.

The Animal Policy Review Board (APRB) is a board established by NASA to review the NASA animal care and use policy and procedures, including this NPR. The board is composed of the NASA Chief Veterinarian as Chair; Center veterinarians; Chairs of each Center's Institutional Animal Care and Use Committees (IACUC); other representatives of each Center as appointed by Center Directors; a public affairs, a legal, and a legislative representative; and other experts in animal care and use, as appointed by the Authorized NASA Official (ANO). The NASA Chief Veterinarian shall appoint the Executive Secretary.

Animal Welfare Assurance is the document submitted by an institution to the Office of Laboratory Animal Welfare (OLAW) at the National Institutes of Health (NIH) ensuring institutional compliance with the PHS Policy.

Assurance Number is a number issued by OLAW to institutions that have an approved AWA.

Attending veterinarian is a person who graduated from a veterinary school accredited by the American Veterinary Medical Association's Council on Education, or has a certificate issued by the American Veterinary Medical Association's Education Commission for Foreign Veterinary Graduates; has received training and/or is experienced in laboratory animal science and medicine, or in the care of the species being used, and who has direct or delegated authority and responsibility for

activities involving animals.

The ANO is the NASA Administrator's representative responsible for all NASA activities involving animals. This individual is responsible for implementation of the provisions of this NPR and for ensuring that Agency programs involving animals comply fully with all applicable laws, regulations, and guidelines. NASA Policy Directive (NPD) 8910, Care and Use of Animals, designates the NASA Headquarters Chief Health and Medical Officer (CHMO) as the ANO.

Crewmember is any person assigned to a spacecraft or an aircraft mission.

Institute of Laboratory Animal Resources (ILAR) is a component of the National Academy of Sciences, National Research Council dedicated to fostering the responsible care and use of laboratory animals in biomedical research. ILAR publishes various guidelines for animal care and use and is the responsible office for preparation and publication of the 1996 edition of the Guide.

Institution is any public or private organization, business, or agency (including components of Federal, state, and local Governments). In the case of NASA, an "institution" is a NASA Center.

Institutional Animal Care and Use Committee (IACUC) is a committee established in accordance with the requirements of the AWA and PHS Policy at each institution using animals in research, testing, or training activities.

Institutional Official as used in the AWA refers to NASA Center Directors or the Center Director's designee.

Institutional Review Board (IRB) is a committee established, in accordance with NPD 7100.8, Protection of Human Research Subjects.

Interagency Research Animal Committee (IRAC) was established in 1983 by the Assistant Secretary for Health, U.S. Department of Health and Human Services. It is intended to be a focal point for Federal agencies to discuss issues involving animals used for research, testing, and training.

International Council for Laboratory Animal Science (ICLAS) is an international nongovernmental scientific organization that was founded in 1961, under the auspices of United Nations Educational, Scientific and Cultural Organization (UNESCO) and several scientific unions. The aims of ICLAS are to promote and coordinate the development of laboratory animal science throughout the world, to promote international collaboration in laboratory animal science, to promote the definition and monitoring of quality laboratory animals, to collect and disseminate information on laboratory animal science, and to promote the humane use of animals in research, testing, and teaching through recognition of ethical principles and scientific responsibilities. The U.S. representative is designated by ILAR.

Investigator is any person who uses or proposes to use animals in NASA-supported activities (see also Principal Investigator).

The NASA Flight Animal Care and Use Panel (NFACUP) provides Agency animal care and use policy concurrence for space flight activities and assures NASA compliance with the Committee on Space Research (COSPAR) Policy and Guidelines for the Use and Care of Animals in Space-borne Research. It provides senior NASA research subject protection management with further insight and awareness of space flight activities involving animals.

Office of Laboratory Animal Welfare (OLAW) is the division of National Institutes of Health (NIH) responsible for overseeing implementation and enforcement of the PHS Policy on Humane Care and Use of Laboratory Animals.

Principal Investigator (PI) is an investigator who has overall responsibility for all aspects of a

NASA-supported animal activity and has received authorized funding (either Government or corporate, as applicable) to conduct such activities.

PHS includes, among others, the Centers for Disease Control, the Food and Drug Administration, the Health Resources and Services Administration, and NIH.

Research or Flight Program Manager is the person designated by NASA Headquarters to manage each program in which NASA has a research or payload interest. Programs may consist of several projects.

Research or Flight Project Manager is the person designated by a Center Director to manage individual projects.

NASA Selection Official is any person authorized to make final selections of programs or projects to be supported by the Agency.

NASA Chief Veterinarian is a veterinarian appointed by the ANO to coordinate veterinary and animal care and use activities on an Agency-wide basis. The NASA Chief Veterinarian may be a NASA civil servant or one appointed under the Intergovernmental Personnel Act (IPA) provision. He/she also serves as Chairperson of the NACUPRB.

Support means activities involving animals funded by or sponsored by NASA, or conducted in or on NASA facilities, aircraft, or spacecraft. Such activities include those conducted under a contract, cooperative agreement or grant, reimbursable agreement, or other arrangement or agreement, entered into by NASA and another Government agency, private entity, non-Federal public entity, or foreign entity.

Duty Veterinarian is a veterinarian appointed by the NASA Chief Veterinarian to serve as the attending veterinarian responsible for animal care and use issues associated with a flight mission in progress.

Appendix B. Acronyms

AAALAC	Association for Assessment and Accreditation of Laboratory Animal Care
ANO	Authorized NASA Official
APHIS	Animal and Plant Health Inspection Service
APRB	Animal Policy Review Board
ARC	Ames Research Center
AWA	Animal Welfare Act
C.F.R.	Code of Federal Regulations
CHMO	Chief Health and Medical Officer
CIOMS	Council for International Organization of Medical Sciences
COSPAR	Committee on Space Research
DEA	Drug Enforcement Agency
IACUC	Institutional Animal Care and Use Committees
ICLAS	International Council for Laboratory Animal Science
ILAR	Institute of Laboratory Animal Resources
IO	Institutional Officials
IRAC	Interagency Research Animal Committee
IRB	Institutional Review Board
JSC	Johnson Space Center
NFACUP	NASA Flight Animal Care and Use Panel
NIH	National Institutes of Health
OLAW	Office of Laboratory Animal Welfare
PHS	Public Health Service
PI	Principal Investigator
UNESCO	United Nations Educational, Scientific and Cultural Organization
U.S.C.	United States Code
USDA	U.S. Department of Agriculture
USOS	U.S. Operating Segment
VASR	Vertebrate Animal Science Review

Appendix C. NASA Principles for the Ethical Care and Use of Animals

C.1 Introduction - A strong allegiance to the principles of bioethics is vital to any discussion of responsible research practices. As reflected in the considerations of the National Commission for the Protection of Human Subjects, "scientific research has produced substantial social benefits... [and] some troubling ethical questions" (The Belmont Report, 1979). The Belmont Report identified the key fundamental principles underlying the ethical evaluation of research involving human subjects. Similarly, the principles governing the ethical evaluation of the use of animals in research are to be made equally explicit.

C.2 It is generally agreed that vertebrate animals warrant moral concern. The following principles are offered to guide careful and considered discussion of the ethical challenges that arise in the course of animal research, a process that balances risks, burdens, and benefits. NASA will abide by these principles, as well as all applicable laws and policies that govern the ethical use of animals. It is recognized that awareness of these principles will not prevent conflicts. Rather, these principles are meant to provide a framework within which challenges can be rationally addressed.

C.3 Basic Principles - The use of animals in research involves responsibility, not only for the stewardship of the animals but to the scientific community and society as well. Stewardship is a universal responsibility that goes beyond the immediate research needs to include acquisition, care, and disposition of the animals, while responsibility to the scientific community and society requires an appropriate understanding of and sensitivity to scientific needs and community attitudes toward the use of animals.

C.4 Among the basic principles generally accepted in our culture, three are particularly relevant to the ethics of research using animals: respect for life, societal benefit, and non-maleficence.

C.5 Respect for Life - Living creatures deserve respect. This principle requires that animals used in research should be of an appropriate species and health status and that the research should involve the minimum number of animals required to obtain valid scientific results. It also recognizes that the use of different species may raise different ethical concerns. Selection of appropriate species should consider cognitive capacity and other morally relevant factors. Additionally, methods such as mathematical models, computer simulation, and in vitro systems should be considered and used whenever possible.

C.6 Societal Benefit - The advancement of biological knowledge and the improvements in the protection of the health and well-being of both humans and other animals provide strong justification for biomedical and behavioral research. This principle entails that, in cases where animals are used, the assessment of the overall ethical value of such use should include consideration of the full range of potential societal good, the populations affected, and the burdens that are expected to be borne by the subjects of the research.

C.7 Non-maleficence - Vertebrate animals are sentient. This principle entails that the minimization of distress, pain, and suffering is a moral imperative. Unless the contrary is established, investigators should consider that procedures that cause pain or distress in humans may cause pain or distress in other sentient animals.

Appendix D. Policy on Communication of Animal Health and Welfare During NASA Space Flight Missions

D.1 Policy - The health and well-being of experimental animals used during space flight are of the highest importance to NASA for both ethical and scientific reasons. Decisions made regarding the health status and fitness of experimental animals will be made by qualified individuals with training appropriate to determine the type of interventions necessary to minimize pain and distress in the experimental animal and to maximize the return of scientific knowledge.

D.2 The need for voice communication during flight will be at the request of the crewmembers and limited to circumstances, which extend beyond crew training, which affect animal health and well-being. Should unexpected or critical conditions exist which warrant immediate attention, at the U.S commander's or U.S. Operating Segment lead's (USOS) determination, a veterinary consultation with the NASA Chief Veterinarian or the duty veterinarian may be requested. Such communication may occur via an open or closed voice loop and will be restricted to animal welfare issues, which require a decision to provide extraordinary intervention or to euthanize the experimental animals. Likewise, if conditions are detected from the ground which indicate imminent failure of the animal habitats or host systems and subsequent compromise of animal welfare, the NASA Chief Veterinarian or duty veterinarian may inform the crewmembers. The U.S. commander or USOS may request authorization from the NASA Chief Veterinarian to down link relevant images of affected animals for review by the NASA Chief Veterinarian or the duty veterinarian to assist in a decision to euthanize the animals. Such a request will only be authorized when other means of communicating the animals' clinical status have been ineffective.

D.3 The decision to euthanize experimental animals will be made by the NASA Chief Veterinarian with input from the crewmembers regarding the animals' condition. The Project Scientist, the Project Manager, and the Principal Investigator, whose work will be affected, will be consulted regarding the circumstances and the impact of the decision. The NASA Chief Veterinarian will make the final decision to euthanize animals for humane reasons. The crewmembers will be informed of such decision for implementation. The NASA Chief Veterinarian will be responsible for communicating the circumstances and procedures associated with the decision to NASA Headquarters, affected research teams, and in a timely manner to the Congress and the press through the Office of Legislative and Intergovernmental Affairs and Office of Communications, respectively.

Appendix F: Optional Supporting Material for the Vertebrate Animal Science Review (VASR)

Detailed Instructions for Preparation of the VASR Worksheet
These instructions are to assist applicants in preparing their VASR information.

Preparation of the VASR worksheet:
Typically, all of the required elements for the VASR can be addressed within 1-2 pages.

Point 1 - Description of animals and how they will be used
A concise, complete description of the proposed procedures must be included in the VASR. While additional details may be included in the Research Strategy, a coherent, albeit brief, description of the proposed use of the animals must be provided within the VASR. The description must include sufficient detail to allow evaluation of the procedures. Examples of the types of procedures that should be described include blood collection, surgical procedures, administration of substances, tumor induction, and post-irradiation procedures. In describing the animals, investigators must provide the following information for each species and/or strain to be used:
• Species
• Strain
• Ages
• Sex
• Number of animals to be used

Point 2 - Justifications for use of animals
Investigators must justify the use of animals in the proposed research. The justification must indicate why alternatives to animals (e.g., computer models, cell culture) cannot be used and should indicate the potential benefits and knowledge to be gained. In addressing this point, researchers are encouraged to consider means to replace, reduce, and refine the use of animals. Rationale for the choice of species must be provided. The rationale should indicate the advantages of the species chosen and why alternative species are not appropriate. If less highly evolved or simpler animal models are available, justification must be provided for using more advanced species. For example, the use of non-human primates (NHP), dogs, or cats should be thoroughly justified. If NHP species are to be used, a comparison to other NHP species may be appropriate. If animals are in short supply, costly, or to be used in large numbers, provide an additional rationale for their selection and the number of animals used.

Estimates for the number of animals to be used should be as accurate as possible. Justification for the number of animals to be used should include considerations of animal availability, experimental success rate, inclusion of control groups and requirements for statistical significance. Cite power calculations, where appropriate.

Point 3 - Veterinary care
Descriptions of veterinary care should indicate the availability of veterinarians or veterinary technicians. For example, the VASR might indicate the number of veterinarians and veterinary technicians associated with the applicant institution and their proximity to the performance site(s). The frequency with which veterinary staff observe or monitor animals should be stated. If survival surgeries are proposed, veterinary involvement or post-surgical monitoring should be described. For example, if animal use involves invasive approaches that might result in discomfort, distress, or pain, the investigator should indicate if or when veterinary care is necessary. The indicators for veterinary intervention to alleviate discomfort, distress, or pain should be described. The ways in

which veterinary staff may intervene should be described.

Point 4 - Provisions to minimize discomfort, distress, pain, and injury
Procedures or circumstances that may result in more than momentary discomfort, distress, pain, or injury should be identified. Methods to alleviate discomfort, distress, or pain should be described. If pharmacological agents are used, the agent(s) should be specified by name or class. Any additional (e.g., non-pharmaceutical) means to avoid discomfort, distress, pain, or injury should be described briefly. The manner, circumstances, and duration of all post-surgical provisions and care should be described. If special housing is necessary following surgery or manipulations, the VASR should describe these provisions, the duration and type of monitoring provided. If procedures (e.g., pharmacological or surgical) might lead to severe discomfort, distress, pain, or injury indicators for humane endpoints and euthanasia (e.g., severe infection, respiratory distress, failure to eat, tumor size) should be described. All of these issues are particularly important for survival surgeries. If multiple surgeries are proposed, these must be well justified and provisions to avoid any potential complications must be described. Describe how restraining devices will be used, if applicable.

Point 5 - Euthanasia
The method(s) of euthanasia must be described and must comply with the AVMA Guidelines on Euthanasia. If the method(s) do not comply with AVMA recommendations, the rationale and scientific justification for use of the method(s) must be provided. The indicators for euthanasia (i.e., termination of experiment or humane endpoints) should be stated. It is not sufficient to state simply that humane methods will be used, that are consistent with the recommendations of the AVMA Guidelines on Euthanasia or the Institutional Animal Care and Use Committee (IACUC).

References
Guidance in this document is based on NASA and PHS Policy, and Federal requirements. The NASA and PHS Policy incorporate the standards in the Guide for the Care and Use of Laboratory Animals and require that euthanasia be conducted according to the AVMA Guidelines on Euthanasia. Additional background information and references are available from the Office of Laboratory Animal Welfare, National Institutes of Health (available on-line).

NASA Policy and Requirements

NASA Policy Directive 8910.1 - Care of Use of Animals (available on-line i the NASA NODIS library).
NASA Procedural Requirements 8910.1 - Care of Use of animals (available on-line i the NASA NODIS library).

PHS Policy

Public Health Policy on Humane Care and Use of Laboratory Animals, Office of Laboratory Animal Welfare, National Institutes of Health, 2002 (available on-line).

Guide for the Care and Use of Laboratory Animals, Eighth Edition, Committee for the Update of the Guide for the Care and Use of Laboratory Animals, Institute for Laboratory Animal Research Division on Earth and Life Studies, National Academies Press, Washington, DC, 20011(available on-line).

AVMA Guidelines on Euthanasia

AVMA Guidelines for the Euthanasia of Animals: 2013 Edition, American Veterinary Medical Association, 2013, (available on-line).

Checklist to Assist in Addressing the Required Five Points of

the VASR

Performance site(s):

The five points must be addressed for all performance sites.

__ If the applicant's institution is not where animal work will be performed, are all collaborative performance site(s) identified?

__ If more than one performance site is planned, are descriptions of animal care and use for each site provided?

Point 1 - Describe the animals and their proposed use; address the following for all species to be used:
__ Species.
__ Strains.
__ Ages.
__ Sex.
__ Number of animals to be used.
__ A concise, but complete, description of proposed procedures (i.e., sufficient information for evaluation).

Point 2 - Provide justifications for:
__ The use of animals.
__ Choice of species.
__ Number of animals to be used (cite power calculations, if appropriate).

Point 3 - Provide a general description of veterinary care, including veterinary support that is specifically relevant to the proposed procedures. Indicate the following:
__ A brief account of veterinary staff and their availability.
__ The regular schedule of monitoring of animals by veterinary staff.
__ Any additional monitoring and veterinary support that may be required to ensure humane care, if relevant to the procedures proposed (e.g., post-surgical).
__ Indicators for veterinary intervention to alleviate discomfort, distress, and/or pain, if relevant.

Point 4 - Describe procedures to minimize discomfort, distress, pain, and injury. Indicate the following:
__ Circumstances relevant to the proposed work, when animals may experience discomfort, distress, pain, and/or injury.
__ Procedures to alleviate discomfort, distress, pain, and/or injury.
__ Identify (by name or class) any tranquilizers, analgesics, anesthetics, and other treatments (e.g., antibiotics) and describe their use.
__ Provisions for special care or housing that may be necessary after experimental procedures.
__ Plans for post-surgical care, if survival surgeries are proposed.
__ Indicators for humane experimental endpoints, if relevant.
__ Describe the use of restraint devices, if relevant.

Point 5 - Describe methods of euthanasia:
__ Describe the method(s) of euthanasia and rationale for selection of method(s).
__ Indicate if the method is consistent with AVMA Guidelines on Euthanasia.
__ Provide a scientific justification for the choice of method, if not AVMA recommended.

Example of a complete VASR Worksheet

(This VASR worksheet has been modified from the original. It addresses all five points concisely.)

Vertebrate Animals
Aims 1-3 will be addressed in vitro; Aim 4 will be addressed using a mouse model of ocular infection.

1. Female Balb/c mice will be used to determine if virions treated with enzyme can cause viral keratitis, and to test the in vivo efficacy of the test articles. The studies will require 700 mice, four to six weeks old. Based on prior experience, 70 groups, each including 10 mice will be required over five years to achieve adequate statistical power. Ocular infection is accomplished by scratching the cornea of anesthetized mice with a sterile needle and exposing the scarred portion of the cornea to inoculum. Test articles are applied directly to the scarified cornea as liquid or cream. Following inoculation and recovery, mice are monitored for 30 days. With the mice under anesthesia, the eyes will be examined at intervals, microscopically, and are flushed with medium with 2% serum to determine viral titers. Thirty days post-infection, with the mice under deep anesthesia, the trigeminal ganglia are removed aseptically for viral assay, followed immediately by euthanasia.

2. The proposal is to study mechanisms for the prevention of ocular disease caused by viral infections, a leading cause of blindness in the U.S. Mice are needed for these experiments because no alternative in vitro model incorporates all elements of the mammalian ocular immune system; too little is known about this system for the development of computer simulations. Mice are a well-accepted model for studying viral keratitis, assessing the virulence of viral strains and testing the efficacy of antivirals. Mice provide several advantages: a) The murine ocular immune system is similar enough to that of humans to allow extrapolation of the results, b) Their small size allows the use of smaller amounts of drugs for testing, c) The entire mouse genome is known and easily manipulated genetically, allowing extension of the work in future genetic studies. Female mice will be used due to compatibility issues. Balb/c mice will be used because they have intermediate resistance to infection. ABC-4 knockout and ABC-4 test-strains will be used. For the enzyme study, we will use four treatment groups: enzyme-1, enzyme-2, enzyme-3, and mock treated virus. We will also use different amounts of inoculum for each condition allowing a more accurate calculation as to the effect of the digestions on infectivity. For the test-article peptide study, we will use two formulations (one aqueous and one hydrophobic), test four different concentrations, and also vary the treatment protocol. Two groups will receive a single dose of drug in each of the two formulations prior to the addition of virus to assess prophylactic activity. These groups will not receive any additional enzyme treatments. Two groups will be infected with virus and beginning 4 h post-infection, we will treat with each formulation and concentration, four times daily for seven days.

3. All mice are housed in the Animal Resources Center of the University. Animal housing rooms are under temperature and humidity control. The mice will not be subjected to water or food restrictions, and bedding material is placed in each cage. The facility is staffed by four full time veterinarians and six veterinary technicians; the veterinary staff is on site and a clinical veterinarian is available at all times. Animal care staff conducts routine husbandry procedures (e.g., cage cleaning, feeding, and watering) and checks animals daily to assess their condition. Laboratory staff monitors mice when treatments are given, disease is scored or samples are collected for titering. The veterinary staff monitors mice in their home cages, weekly. If animals exhibit any indication of infection or distress, the veterinary staff confers with laboratory personnel to recommend appropriate antibiotics, analgesics, or other pharmaceuticals. The veterinary staff may intervene or recommend euthanasia based on animal welfare concerns.

4. Mice will be anesthetized with isoflurane (3-5%) during the infection process, when treatments are administered and titer samples are collected. This eliminates the need for restraint devices and

topical anesthetics that would interfere with the infection and disease process. For post-procedural pain relief, we will administer buprenorphine twice daily for the duration of the experiments (i.e., approximately two weeks post-inoculation). Death is not an endpoint for the studies; the Balb/c strain was chosen because of its resiliency and resistance to this particular virus. Our goal is to avoid severe infections leading to death. Though unlikely, if an animal reacts severely, it will be euthanized, based on humane indicators (e.g., failure to groom or feed). These experiments involve no post-surgical survival animals.

5. All mice will be euthanized by cervical dislocation under isoflurane anesthesia. Isoflurane ensures that the mice are unconscious, while dislocation ensures quick death. This minimizes animal distress, is effective and efficient; it is consistent with the recommendations of the AVMA Guidelines on Euthanasia.

Appendix G. Instructions for Vertebrate Animal Science Review Reviewers (VASR)

G.1 These instructions are to assist Scientific Merit Review Panel (SMRP) members in the VASR review of the proposal.

Subsequent to evaluation of the VASR worksheet by a SMRP, all proposals are coded as either No Vertebrate Animals, No Concerns/Acceptable, or Concerns/Unacceptable.

G.2 Coding as NO VERTEBRATE ANIMALS - If vertebrate tissue used in the study is obtained from other sources (e.g., tissue repository, animals euthanized for an unrelated purpose), the proposal is coded as no vertebrate animals used. The source of the tissue should be included in the VASR to validate the coding as no vertebrate animals used. If vertebrate tissues are obtained through euthanasia for tissue harvest, the proposed research is coded as use of live vertebrate animals. The generation of custom antibodies must be coded as use of live vertebrate animals.

G.3 Coding as NO CONCERNS/ACCEPTABLE or CONCERNS/UNACCEPTABLE - Coding is based on the review of the five required points for each of the performance sites.

Performance site(s): This is defined as the institutions where procedures with animals will be performed. If the applicant institution is not the site where animal work will be performed, the performance site must be identified. If there is more than one performance site, the description of animal care and use at each site must be included and must address the five points.

Appendix E: Required Vertebrate Animal Scientific Review (VASR) Text for NASA Research Solicitations

Vertebrate Animal Scientific Review (VASR)

If vertebrate animals are to be used, the following five points must be addressed completely by applicants in the VASR worksheet of their proposal:

1. Detailed description of the proposed use of the animals, including species, strains, ages, sex and number to be used.

2. Justification of the use of animals, choice of species and numbers to be used, and proposer's assessment of potential benefits and knowledge to be gained.

3. Information on the veterinary care of the animals.

4. Description of procedures for ensuring discomfort, distress, pain, and injury are minimized.

5. Method of euthanasia and the reasons for its selection.

Each of the five points must be addressed, for all performance sites, in the VASR worksheet. The VASR worksheet will be reviewed by the scientific merit review panel and the proposal coded as either No Vertebrate Animals, No Concerns/Acceptable, or Concerns/Unacceptable. If coded as Unacceptable, NASA staff will work with the applicant to resolve concerns prior to award. Coding of the proposal as Acceptable or No Vertebrate Animals is required prior to award.

In order to be coded as "No vertebrate animals" the vertebrate tissue used in the study will be obtained from other sources (e.g., tissue repository, animals euthanized for an unrelated purpose). The source of the tissue should be included in the VASR to validate the coding as no vertebrate animals used. If vertebrate tissues are obtained through euthanasia for tissue harvest, the proposed research is coded as use of live vertebrate animals. The generation of custom antibodies is coded as use of live vertebrate animals.

A "performance site(s)" is defined as the institutions where procedures with animals will be performed. If the applicant institution is not the site where animal work will be performed, the performance site must be identified. If there is more than one performance site, the description of animal care and use at each site must be included and must address the five points.

Applicants should be aware that NASA may release information contained in funded proposals pursuant to a Freedom of Information Act request.